Federal-State Cooperative
Snow Surveys and Water Supply Forecasts
for
ARIZONA

SOIL CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

Data included in this report were obtained by the agency named above in cooperation with the Federal, State and local organizations listed on the last page of this report.

AS OF
FEBRUARY 1, 1955

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

TO RECIPIENTS OF COOPERATIVE SNOW SURVEY
AND WATER SUPPLY FORECAST REPORTS:

Forecasts by U. S. Weather Bureau of total annual streamflow October-September, inclusive, at more than 300 gaging stations are issued monthly January through May in the publication WATER SUPPLY FORECASTS FOR THE WESTERN UNITED STATES.

Weather Bureau forecasts of runoff presented in that bulletin are computed from procedures based on mathematical analysis of the relation between precipitation and runoff.

The Weather Bureau bulletins may be secured by writing to:

Hydrologist in Charge
River Forecast Center
U. S. Weather Bureau
712 Federal Office Building
Kansas City 6, Missouri

For current information on local river and flood conditions, reference should be made to the appropriate River District Office, listed below:

Meteorologist in Charge Weather Bureau Airport Station 3000 Sky Harbor Blvd., Phoenix, Arizona	Colorado River and tributaries in Arizona except San Juan

State of Arizona

COOPERATIVE SNOW SURVEYS and WATER SUPPLY FORECASTS

for

A R I Z O N A

(Salt, Verde, Gila
and
part of Lower Colorado River Basin)

Issued
February 1, 1955

Report Prepared
By
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Salt River Valley Water Users' Association
and
Soil Conservation Service
Main Post Office Bldg.
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Issued By

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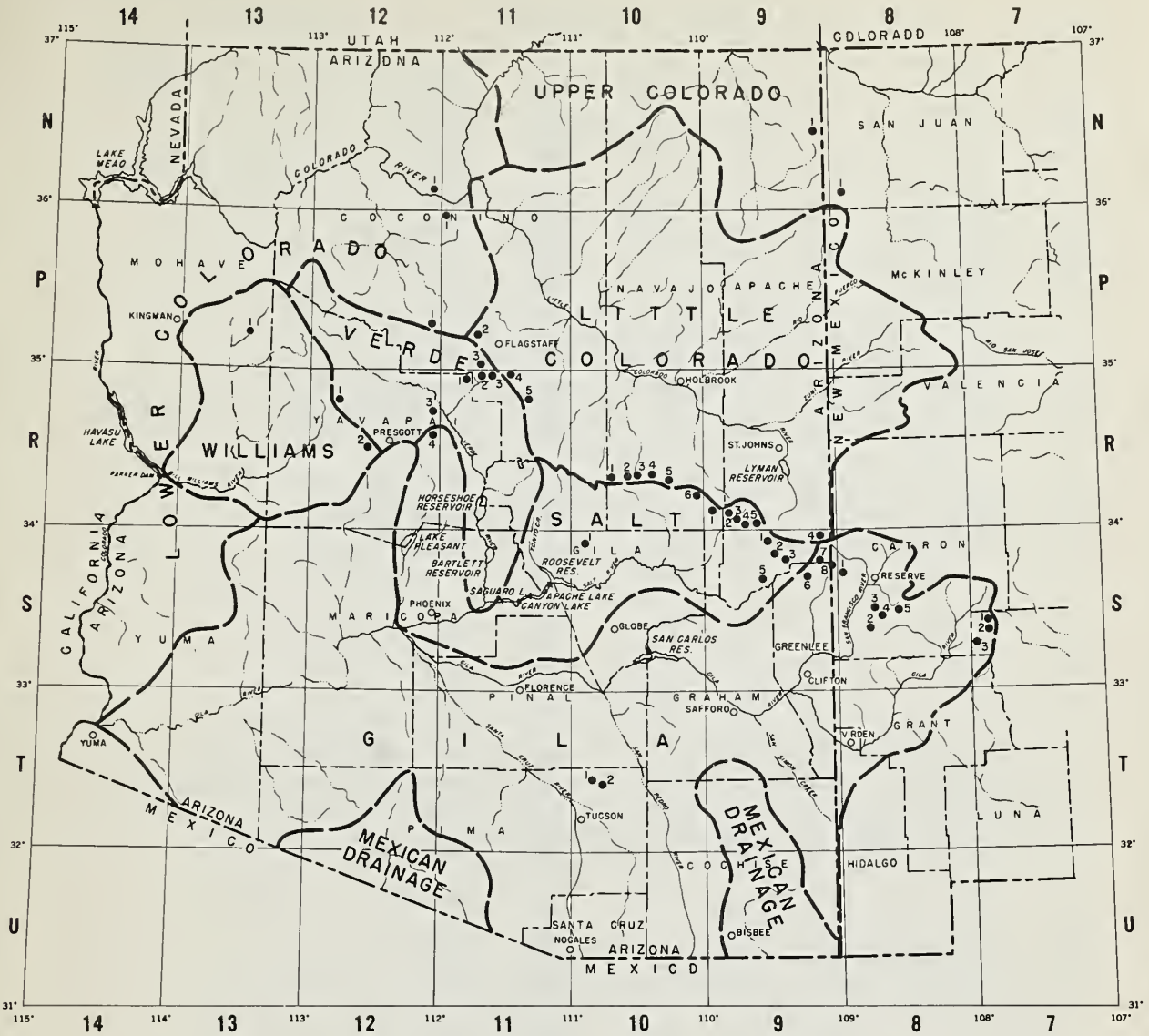

LEGEND

DRAINAGE BASIN BOUNDARY

13● SNOW COURSE

ARIZONA
COOPERATIVE SNOW SURVEYS

SNOW COURSES AND DRAINAGE BASINS
JANUARY 1955

0 40 80 120 160 200

SCALE IN MILES

INDEX TO SNOW COURSES

NUMBER	NAME	SEC	TWP	RGE**	ELEVATION	RIVER BASIN
11-P-3	Antelope Park	29	19N	8E	7300	Verde # ..... Discontinued
9-S-1	Baldy	28	7N	27E	9000	Salt-Little Colorado
10-T-1	Bear Wallow	6	12S	16E	8100	Gila
9-S-6	Beaver Head	13	4N	30E	8000	Salt-Frisco
9-S-3	Big Lake Knoll	2	5N	28E	8800	Salt-Frisco-Little Colorado .. Discontinued
7-S-3	Black Canyon	8	13S	11W***	6790	Gila
12-N-1	Bright Angel	34	33N	3E	8400	Lower Colorado
12-R-1	Camp Wood	3	16N	6W	5700	Williams-Verde
10-R-3	Canyon Creek (s)	18	11N	15E	7500	Salt
11-R-2	Casner Park (s)	19	18N	8E	6950	Verde
12-P-1	Chalender (s)	27	22N	3E	7100	Verde
8-S-3	Corner Mountain	7	10S	17W***	8850	Gila-Frisco
9-S-7	Coronado Trail	26	5N	30E	8000	Salt-Frisco
10-R-2	Elk	31	11N	14E	7600	Salt-Little Colorado ..... Discontinued
10-R-6	Forest Dale (s)	2	9N	21E	6000	Salt-Little Colorado
12-R-4	Gaddes Canyon	11	15N	2E	7600	Verde #
10-R-5	Gentry	36	11N	15E	7600	Salt-Little Colorado
11-P-2	Fart Valley	22	22N	6E	7350	Verde #
9-R-5	Ft. Apache	18	7N	27E	9160	Salt-Little Colorado
8-S-1	Frisco Divide	31	6S	20W***	8000	Frisco-Gila
11-P-1	Grand Canyon	21	30N	4E	7500	Lower Colorado
11-R-5	Happy Jack	30	17N	9E	7630	Verde
10-R-4	Heber	28	11N	15E	7600	Salt-Little Colorado
7-S-2	Inman	6	11S	10W***	7800	Gila
12-R-2	Iron Springs	22	14N	3W	6200	Williams-Verde
9-S-2	Maverick Fork (s)	13	6N	27E	9050	Salt-Little Colorado
9-R-4	McKay Peak	13	7N	24E	8250	Salt ..... Not read
9-R-2	McNary (s)	14	8N	23E	7200	Salt-Little Colorado
9-R-1	Milk Ranch	28	8N	23E	7000	Salt
12-R-3	Mingus Mountain	3	15N	2E	7100	Verde #
8-S-2	Mogollon	2	11S	19W***	7000	Frisco-Gila
11-R-4	Mormon Lake	13	18N	8E	7350	Verde #
11-R-3	Mormon Mountain(s)	14	18N	8E	7500	Verde
11-R-1	Munds Park (s)	7	18N	7E	6500	Verde
8-S-4	N-Bar Lake	16	10S	17W***	8600	Gila
8-S-5	Negrito	6	10S	16W***	8200	Gila
9-S-4	Nutrioso	23	6N	30E	8500	Salt-Frisco-Little Colorado
9-S-5	Pacheta	At town of Maverick, Ariz.			7800	Salt
9-N-1	Roof Butte	15	8N	6W****	8500	Little Colorado # ..... Not read
10-T-2	Rose Canyon	15	12S	16E	7300	Gila
9-S-8	State Line	6	6S	21W***	8000	Gila-Frisco
7-S-1	Taylor Creek	20	10S	10W***	7850	Gila
9-R-3	Trout Creek	5	7N	24E	6400	Salt ..... Not read
8-N-1	Washington Pass	Lat. 36°05'N. Long. 108°50'W. §			8600	Little Colorado # ..... Not read
13-P-1	Willow Ranch	16	21N	11W	5000	Williams
10-R-1	Woods Canyon	15	11N	13E	7640	Salt-Little Colorado ..... Discontinued
10-S-1	Workman Creek	33	6N	14E	6900	Salt

* Number indicates location of course within coordinate rectangle, thus 9-N-1 is Course #1 in coordinate rectangle 9-N.

** All in Gila and Salt River Base and Meridian except where otherwise indicated.

*** New Mexico Principal Meridian.

**** Navajo Base.

On adjacent drainage.

(s) Soil Moisture Station installed on or in vicinity of course.

§ Unsurveyed.

WATER SUPPLY OUTLOOK

ARIZONA

FEBRUARY 1, 1955

The water supply outlook based on February 1 conditions is for much below average runoff. January storms have done little to improve the situation, and present weather conditions are such as to promote rapid loss of water from the existing snow pack through evaporation and sublimation. There is ample time remaining in the season, however, for a change in conditions or for heavy storms to occur that would substantially alter the situation.

GENERAL

Snow depths and water content are generally near or above average for this date over the Arizona drainages. However, most courses in New Mexico are reported as bare and the observers note that bare ground extends up as high as 7800 feet on exposed slopes. Arizona snow line is in the 5000 to 6500 foot range.

The snow is universally dry and powdery. Flakes are small, like buckshot, and have little adhesion. Some old crust layers were noted beneath the surface, but much of the more recent snow is not crusted. It is being blown around considerably and some drifting is taking place. In the White Mountain area, the snow surface is extensively rippled much like wind-blown sand, and what crust had formed is undermined, with the loose snow blown out from beneath the crust.

At lower elevations, large areas of bare ground were noted. Persistent cold weather has frozen practically all streams, with the smaller ones completely covered with snow. In some spots, the ground was frozen beneath the snow. At the higher elevations, there is little or no crusting or consolidation of the pack taking place. Mid-day air temperatures in the sun were noted below 20°. It appears probable that substantial amounts of the present moisture may be lost directly through sublimation if current weather conditions persist.

Fall precipitation was below normal on all drainages, causing soil moisture to be very deficient. February 1st

measurements of soil moisture content at the eight metering locations installed last summer, show that only in occasional spots has there occurred any accumulation of water in the soil to start overcoming the deficiencies. All meters show that the ground is dry to the wilting point for the full depth except at Canyon Creek, where there is some moisture present in the upper foot of the soil column. The moisture present in the snow pack at this time would be entirely absorbed by the soil if orderly melting conditions should develop.

Spring precipitation was particularly heavy during the first half of January, but little has occurred since then. In many of the higher areas it was reported as actually below normal with the above-normal precipitation confined to lower elevations.

SNOW COVER AND WATERSHED CONDITIONS

Salt River Basin

Snow cover throughout this basin is approximately average. However, the extreme dryness of the soils and the poor physical condition of the snow indicate a probable deficiency of runoff water. Key courses do not average as high as does the basin as a whole and, coupled with the deficiency of antecedent precipitation, give support to the probability of below average runoff. There is still adequate time for conditions to improve or for additional storms to occur which would improve the outlook. However, present long range forecasts are not encouraging and the time during which heavy storms can usually be expected will soon be gone.

The overall situation on this drainage resembles that of last year at this time. It will be recalled that the rather poor conditions were substantially improved by the storms of mid-March 1953. However, in making any comparison it should be noted that the storm was one of exceptional extent, being among the heaviest occurring in a period of some 50 years, and the likelihood of a repetition is rather small.

Stream flow during the fall months and January has been exceptionally low, reflecting a severe depletion of water supplies within the basin. January flows were among the lowest in 40 years, while record lows have been established during the fall months.

Storage in the Salt River reservoirs increased slightly during the month due to lack of demand caused by seasonal conditions and cold weather. Storage still remains sub-

stantially below that of a year ago, and totals approximately 30% of capacity. A low carry-over could develop at the end of this year if runoff prospects do not improve.

Conditions on the Verde drainage are only a little better than on the Salt River basin proper. A small area of above normal conditions exists in the Iron Springs area west of Prescott but is too small to materially affect the runoff outlook for either the Verde or Williams Rivers.

Gila River Basin

Snow cover varies from above average on portions of the Frisco to zero on the eastern edge of the Gila Watershed. Water contents range from a high of 3.7 inches at the State Line and 2.8 on the Frisco Divide to nothing over much of the area. The highly significant course at Beaver Head Lodge near Alpine is reported as having a snow cover of 13.7 inches with 2.6 inches of water content, compared with an average content of 3.0 inches.

Soil moisture on this drainage is also seriously below normal. Fall precipitation was almost non-existent and the January rains in western Arizona did not extend this far eastward. Stream flows have been at about 60% of normal, further reflecting the extremely dry conditions of the drainage basin.

Water in storage in San Carlos reservoir is now approximately 38,000 acre feet, compared with almost zero storage on the same date last year.

STREAM FLOW FORECASTS FEBRUARY 1, 1955

The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature during the forecast period will be near average. Appreciable deviations from normal of temperature and/or precipitation during the forecast period will correspondingly modify these forecasts.

BASIN, STREAM and STATION	Seasonal Streamflow in Thousands of Acre Ft. Forecast Period Jan. - May, Inclusive				
	Forecast Runoff 1955	% 10-Yr. Av.	Measured Runoff 1954	Measured Runoff 1953	10-Yr. Average 1943-52
Salt River at Intake	81.	24%	234.3	156.3	337.7
Tonto River above Roosevelt	13.	24%	31.4	32.6	53.9
Verde River above Horseshoe	80.	36%	193.5	78.4	221.3
Gila River at Virden	19.5	31%	28.5	30.1	62.1
Frisco River at Clifton	14.1	24%	32.4	19.5	58.2
Little Colorado River above Lyman Dam	1.5	17%	#	2.5	8.9*

* Forecast period for Little Colorado River above Lyman Dam is for January - June, inclusive.

\# Not available.

SUMMARY OF FEBRUARY 1 SNOW SURVEYS AND COMPARISON OF DATA
WITH THAT OF PREVIOUS YEARS BY WATERSHEDS

WATERSHEDS	No. of Courses in Average	Snow Depth 1955 Inches	Snow Water Content in Inches				Snow Density 1955 %	1955 Water Content in percent of	
			1955	1954	1953	Average		1954	Average
Gila River	9	6.6	1.5	0.7	0.6	1.7	22.7	215	88
Salt River	14	14.1	3.5	2.7	2.2	3.5	24.8	121	100
Verde River	9	15.7	4.3	2.2	1.5	3.1	27.4	195	139
Williams River	3	7.8	2.4	1.0	0.0	1.1	30.8	240	218
Lower Colorado River	4	16.3	3.7	2.2	2.2	4.3	22.6	168	86
Little Colorado River	9	13.5	3.7	2.2	1.5	3.3	27.4	168	112

ARIZONA SNOW SURVEY FEBRUARY 1, 1955

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENTS 1955 Date of Survey	Snow Depth (in.)	Water Content (in.)	PAST RECORD Water Content (in.) 1954	1953	Average	Years of Record
GILA RIVER									
Nutrioso	9-S-4	8500	2/2	8.8	2.1	0.6	0.4	2.3	17
Bear Wallow*	10-T-1	8100	1/31	19.3	4.6	3.3	2.3	2.5	7
Frisco Divide	8-S-1	8000	2/2	11.3	2.8	0.7	1.1	2.0	17
State Line	9-S-8	8000	2/2	14.0	3.7	1.2	0.8	2.6	17
Coronado Trail	9-S-7	8000	2/2	11.7	2.5	0.7	1.1	3.3	17
Beaver Head	9-S-6	8000	2/3	13.7	2.6	1.8	2.1	3.0	17
Taylor Creek	7-S-1	7850	2/31	0.0	0.0	0.0	0.0	0.6	13
Inman	7-S-2	7800	2/1	0.0	0.0	0.0	0.0	0.6	9
Rose Canyon*	10-T-2	7300	1/31	12.4	3.2	2.9	0.0	1.0	7
Mogollon	8-S-2	7000	2/1	0.0	0.0	1.1	0.0	0.6	2
Black Canyon	7-S-3	6790	2/1	0.0	0.0	0.0	0.0	0.0	2
SALT RIVER									
Ft. Apache**	9-R-5	9160	2/4	19.5	4.3	5.6	5.0	5.9	5
Baldy	9-S-1	9125	2/4	19.6	4.7	5.0	4.3	5.7	5
Maverick Fork	9-S-2	9020	2/4	23.1	5.6	4.6	4.6	6.6	5
Nutrioso	9-S-4	8500	2/2	8.8	2.1	0.6	0.4	2.3	17
Coronado Trail	9-S-7	8000	2/2	11.7	2.5	0.7	1.1	3.3	17
Beaver Head	9-S-6	8000	2/3	13.7	2.6	1.8	2.1	3.0	17
Pacheta	9-S-5	7800	2/1	13.5	2.9	1.7	0.0	2.6	5
Gentry	10-R-5	7600	2/3	13.2	3.6	2.5	1.3	3.0	5
Heber	10-R-4	7600	2/3	14.2	4.0	2.5	1.3	3.2	5
Canyon Creek	10-R-3	7500	2/3	16.3	4.4	2.7	2.4	3.8	5
McNary	9-R-2	7200	2/1	12.5	3.1	2.3	1.1	2.9	16
Milk Ranch	9-R-1	7000	2/1	8.1	2.5	2.2	0.9	1.8	13
Workman Creek	10-S-1	6900	1/31	15.7	4.4	4.6	6.0	3.6	3
Forest Dale	10-R-6	6430	2/1	7.0	2.2	1.0	0.0	1.2	15
VERDE RIVER									
Happy Jack	11-R-5	7630		N.S.	N.S.	-	1.4	3.3	4
Caddes Canyon	12-R-4	7600	1/31	19.3	2.9	3.6	-	-	1
Mormon Mountain	11-R-3	7500	2/2	19.9	5.4	3.4	3.9	5.0	5
Mormon Lake**	11-R-4	7350	2/1	18.5	5.4	3.5	1.8	5.6	8
Fort Valley**	11-P-2	7350	1/31	11.4	3.0	1.2	1.4	3.1	8
Mingus Mountain	12-R-3	7100	1/31	10.1	2.7	1.2	0.0	1.6	8
Chalender	12-P-1	7100	2/1	17.4	4.4	1.8	2.4	3.6	8
Casner Park	11-R-2	6930	2/2	20.3	5.7	3.2	2.6	4.1	5
Munds Park	11-R-1	6500	2/2	20.1	4.8	2.3	1.7	2.4	5
Iron Springs**	12-R-2	6200	1/31	11.8	4.5	0.8	0.0	1.1	9
Camp Wood	12-R-1	5700	2/1	11.6	2.8	2.1	0.0	1.3	9

* Not included in averages
** On adjacent drainage

ARIZONA SNOW SURVEY FEBRUARY 1, 1955

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENTS						
			1955			PAST RECORD			
			Date of Survey	Snow Depth (in.)	Water Content (in.)	Water Content (in.) 1954	1953	Average	Years of Record
WILLIAMS RIVER									
Iron Springs	12-R-2	6200	1/31	11.8	4.5	0.8	0.0	1.1	9
Camp Wood**	12-R-1	5700	2/1	11.6	2.8	2.1	0.0	1.3	9
Willow Ranch	13-P-1	5000	2/3	0.0	0.0	-	0.0	1.0	9
LOWER COLORADO RIVER									
Bright Angel	12-N-1	8400	2/1	23.1	4.7	4.3	4.5	7.8	7
Grand Canyon	11-P-1	7500	2/1	13.2	2.5	1.4	0.6	2.6	7
Fort Valley	11-P-2	7350	1/31	11.4	3.0	1.2	1.4	3.1	8
Chalender**	12-P-1	7100	2/1	17.4	4.4	1.8	2.4	3.6	8
LITTLE COLORADO RIVER									
Nutrioso	9-S-4	8500	2/2	8.8	2.1	0.6	0.4	2.3	17
Happy Jack	11-R-5	7630		N.S.	N.S.	-	1.4	3.3	4
Gentry	10-R-5	7600	2/3	13.2	3.6	2.5	1.3	3.0	5
Heber	10-R-4	7600	2/3	14.2	4.0	2.5	1.3	3.2	5
Canyon Creek	10-R-3	7500	2/3	16.3	4.4	2.7	2.4	3.8	5
Mormon Mountain	11-R-3	7500	2/2	19.9	5.4	3.4	3.9	5.0	5
Mormon Lake	11-R-4	7350	2/1	18.5	5.4	3.5	1.8	5.6	8
Fort Valley	11-P-2	7350	1/31	11.4	3.0	1.2	1.4	3.1	8
McNary	9-R-2	7200	2/1	12.5	3.1	2.3	1.1	2.9	16
Forest Dale	10-R-6	6430	2/1	7.0	2.2	1.0	0.0	1.2	15

** On adjacent drainage

STATUS OF RESERVOIR STORAGE FEBRUARY 1, 1955

BASIN and STREAM	RESERVOIR	USABLE CAPACITY (Thousand Acre Ft.)	THOUSAND ACRE FEET IN STORAGE ABOUT FEBRUARY 1				
			1955	1954	1953	1952	10 Year Average 1943-52
Agua Fria	Lake Pleasant	178	23.3	32	82	119	15.8
Colorado	Lake Havasu	688	613	611	584	581	591
Colorado	Lake Mohave	1810	1653	1684	1613	1600	-
Colorado	Lake Mead	27935	12305	16501	18964	17352	19129
Gila	San Carlos	1200	38	0	5	147	135
Verde	Bartlett	180	54	4	22	155	35
Verde	Horseshoe	143	1.8	2	14	63	15.5
Salt	Roosevelt	1382	528	611	1026	484	412
Salt	Apache	245	222	244	238	174	188
Salt	Canyon	58	18.5	54	57	47	26.2
Salt	Saguaro	70	53	35	35	39	19.2
Little Colo.	Lyman	28	#	-	9	0	-

Not available.

LIST OF SNOW SURVEYORS

SNOW COURSE	SURVEYOR
Baldy	SCS and SRVWU
Bear Wallow	Wm. Hughes & J.R. Brinkley
Beaver Head	Jess Burke
Black Canyon	Robert M. White
Bright Angel	Valentine & Buss
Camp Wood	Mrs. C. C. Merritt
Canyon Creek	SCS and SRVWU
Casner Park	SCS and SRVWU
Chalender	M. C. Oleson and F. G. Doughert
Corner Mountain	SCS
Coronado Trail	Bill Brainard
Forest Dale	Olson
Frisco Divide	Kenneth Weissenborn
Ft. Apache	SCS and SRVWU
Fort Valley	A. P. Loska
Gaddes Canyon	Richard Enz
Gentry	SCS and SRVWU
Grand Canyon	Dazey and Black
Happy Jack	Emil Ryberg
Heber	SCS and SRVWU
Inman	C. H. McCauley
Iron Springs	Ernest Saxby
Maverick Fork	SCS and SRVWU
Milk Ranch	Olson
Mingus Mountain	Richard Enz
Mogollon	J. R. Wray
Mormon Lake	Robert G. Garey
Mormon Mountain	SCS and SRVWU
Munds Park	SCS and SRVWU
McNary	Olson
N-Bar Lake	SCS
Negrito	SCS
Nutrioso	Bill Brainard
Pacheta	Foch Phillips
Rose Canyon	Wm. Hughes & J.R. Brinkley
State Line	Kenneth Weissenborn
Taylor Creek	F. M. Inman
Willow Ranch	L. W. Miller
Workman Creek	C. L. Moore

The following organizations cooperate in the Arizona snow survey work:

FEDERAL

Department of Agriculture

Forest Service
Apache Forest
Coconino Forest
Coronado Forest
Gila Forest
Kaibab Forest
Prescott Forest
Sitgreaves Forest
Southwestern Forest and Range Experiment Station, Fort Valley, Arizona
Sierra Ancha Forest Experiment Station

Soil Conservation Service

Department of Commerce
Weather Bureau
Arizona Section

Department of Interior

Bureau of Reclamation
Region III

Geological Survey
Arizona District

Bureau of Indian Affairs
Fort Apache Reservation

National Park Service
Grand Canyon National Park

Gila Water Commissioner, Safford, Arizona

IRRIGATION PROJECTS

Salt River Valley Water Users' Association, Phoenix, Arizona

San Carlos Irrigation and Drainage District, Coolidge, Arizona

SOUTHWEST LUMBER MILLS, INC., McNary, Arizona

Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

Federal - State - Private

COOPERATIVE SNOW SURVEYS

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Furnishes the basic data
necessary for forecasting
water supply for irrigation,
domestic and municipal water
supply, hydro-electric power
generation, navigation,
mining and industry

"WATER IS THE WEST'S GREATEST RESOURCE"